

Box 3

HOW CROSS-BORDER CORRELATIONS IN EQUITY MARKETS HAVE CHANGED DURING THE RECENT FINANCIAL TURMOIL

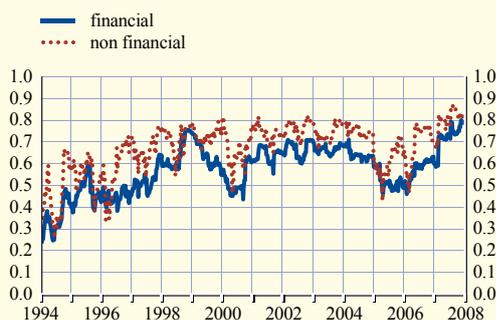
A frequent feature in financial markets during periods of financial strain is the increase in cross-border correlations between, in particular, equity markets. In line with this occurrence, this box discusses time-varying correlations between weekly returns on stocks in financial and non-financial sectors in the United States and the euro area, with special emphasis on developments over the recent financial market turmoil. To put matters into perspective, correlations are first estimated over a long sample period from 1994 to 2007. Then a snapshot of correlations during the recent financial turmoil is reported.¹

Over the long term, cross-country correlations between stock prices in the financial and non-financial sectors in the United States and the euro area have shown a clear upward trend (see Chart A), starting as early as 1994. Correlations increased from about 0.3 at the beginning of the sample to around 0.8 at the end of the period under consideration. This increase in the degree of co-movements between equity markets has been ascribed to a number of factors at play since the early 1990s, e.g. growing cross-border capital flows, the internationalisation of major

¹ Correlations can be estimated unconditionally or, alternatively, conditionally on an information set. This box uses a conditional approach, in that correlation estimates are updated as new information is incorporated in stock market prices. Unconditionally measured correlations, by contrast, do not vary over time and may miss changing economic conditions as reflected in financial market prices.

Chart A Correlations between US and euro area stock market indices

(weekly data)



Source: Datastream and ECB computations.

Note: Correlations are computed according to the methodology proposed by L. Cappiello, R. Engle and K. Sheppard, "Asymmetric Dynamics in the Correlations of Global Equity and Bond Returns", *Journal of Financial Econometrics*, Fall 2006, 4(4), pp. 537-572.

financial institutions, international portfolio diversification and the synchronisation of economic cycles. For instance, developments in the asset prices of global corporations reflect economic shocks in many countries and sectors. To the extent that returns are increasingly determined by global factors, different markets tend to exhibit higher correlations.

Turning to the recent financial market turmoil that started in the summer of 2007, Chart B, panel A, plots time-varying correlations between equity prices in the financial and non-financial sectors in the United States and the euro area, focusing on the last year of data. To appraise the relative magnitude of the changes, correlations are normalised so that they are set equal to one at the beginning of March 2007, when the first tensions surfaced in the US sub-

prime mortgage market. Five broadly distinctive patterns can be detected.

First, correlations displayed a major jump well before the turmoil. At the end of February, correlations soared by about 20%, although proportionally more for financial than for non financial equities. The end of February also saw the largest one-day market fall of 2007 before the summer turmoil. During this period, world stock markets experienced what proved to be a short-lived downward correction triggered by developments in the Chinese markets. At the same time, the increase in correlations coincided with the first acknowledgement of possible risks to the housing market in the United States. Since then, correlations have never reverted to their previously lower levels. In a context of rising delinquencies in sub-prime mortgages in the United States, it seems that markets across the Atlantic suddenly became aware of higher risks in the US housing sector, which could pose downward risks to the main macroeconomic scenario.

Second, between March and mid-July, correlations changed only little. Despite the first wave of downgrades of mortgage-backed securities – and the default of two hedge funds that were heavily exposed to sub-prime structured products – which took place in June, cross-border correlations did not move significantly over this period.

Third, later in July and August, cross-border correlations spiked, particularly for the financial sector. A number of events characterised this period as the core of the turmoil. They included: massive downgrades of sub-prime market-related asset-backed securities and collateralised debt obligations which, in turn, triggered a sharp decline in the value of these securities; soaring money market rates and the standstill of the market for asset-backed commercial paper. Against this backdrop, major central banks stepped in with substantive injections of liquidity in August. While market concerns at this stage seemed to be mostly financial in character, there were also worries about the possible macroeconomic implications.²

² For details on securitisation activity, see the article entitled "Securitisation in the euro area" in this issue of the Monthly Bulletin.

Fourth, between the end of August and October 2007, cross-border correlations declined to some extent, especially for non-financial equities. Following further action by central banks, including September's cut of policy rates by the Federal Reserve, money and equity markets normalised somewhat.

Fifth, from November 2007 onwards, cross-border correlations between financial equities increased further, while those of the non-financial sector remained mostly unchanged. In this respect, correlations between financial stocks drifted upwards as the dislocation of the summer took on the form of a global credit market shock, with severe losses and a steep re-pricing of credit risk. In this period, some major US financial institutions disclosed huge write-downs, related to their exposures to structured finance instruments, with the magnitude of these losses often exceeding investors' forecasts. The increase in cross-border correlations among financials brought their absolute values above the historical peaks of the LTCM crisis in 1998 (see Chart A). Interestingly, cross-border correlations between non-financial stocks declined in September and October, although remaining at high levels. This might suggest that growth spill-overs between the real economies of the United States and the euro area seemed to be a lesser concern to market participants than the global risks derived from the instability of the financial sector.

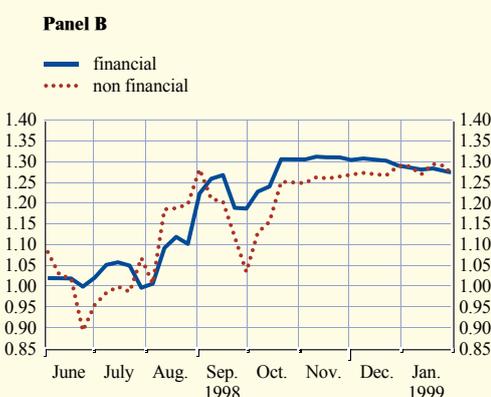
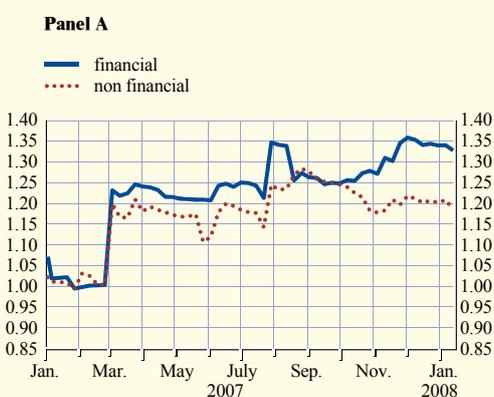
For purposes of comparison, Chart B, panel B, is a snapshot of correlations over a time span that includes the debt default in Russia in August 1998 and the ensuing LTCM crisis. In this case, too, cross-border correlations soared very strongly, both for the financial and for the non-financial sector.

All in all, the recent behaviour of cross-border sectoral correlations is evocative of market participants progressively changing their perceptions of the credit market shocks. Initially, the turmoil was mostly a reaction to a US-based shock. It later spilled over into the global economy, on the account of a possible deterioration of the credit cycle after a long period of very favourable credit conditions.

Chart B Correlations between US and euro area stock market indices for selected periods

(weekly data; index =1 on 1 March 2007)

(weekly data; index =1 on 6 August 1998)



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